The invention in which an exclusive right is claimed is defined by the following:

1. A syringe pump selectively operable in a first mode to accurately dispense small volumes of a fluid, and in a second mode to draw a fluid into the syringe pump more rapidly than can be achieved when the syringe pump is operated in the first mode, comprising:

(a) a syringe having a fluid reservoir and a plunger disposed in the fluid reservoir, such that a linear displacement of the plunger in a first direction displaces a fluid from the fluid reservoir, while a linear displacement of the plunger in an opposite direction draws a fluid into the fluid reservoir from a source;

(b) a driven mass coupled to the plunger, such that a linear displacement of the driven mass correspondingly linearly displaces the plunger;

(c) a driven shaft configured to engage the driven mass, the driven mass being configured to convert a rotational displacement of the driven shaft to a corresponding linear displacement of the driven mass;

(d) a transmission operably coupled to the driven shaft, the transmission enabling the driven shaft to be selectively rotated using at least one of a first drive ratio and a second drive ratio, wherein the first drive ratio is substantially higher than the second drive ratio, such that selection of the first drive ratio enables operation of the syringe pump in the first mode wherein the plunger is moved relatively slowly to accurately dispense small volumes of a fluid, and selection of the second drive ratio enables operation of the syringe pump in the second mode, wherein the plunger is moved relatively quickly to draw a fluid into the fluid reservoir of the syringe pump more rapidly than a fluid is dispensed in the first mode; and

(e) a fluid dispensing motor having a drive shaft, the drive shaft being drivingly coupled to the transmission, such that a rotation of the drive shaft results in a corresponding rotation of the driven shaft, based on the drive ratio selected by the transmission.

2. The syringe pump of Claim 1, further comprising a bearing disposed to rotatably support the driven shaft.

3. The syringe pump of Claim 1, wherein the first drive ratio substantially increases a number of rotations of the fluid dispensing motor drive shaft required to achieve a single rotation of the driven shaft.

4. The syringe pump of Claim 1, wherein the second drive ratio is such that each rotation of the fluid dispensing motor drive shaft substantially achieves a single rotation of the driven shaft.

5. The syringe pump of Claim 1, wherein the transmission comprises:

(a) a first drive train configured to selectively drivingly couple the drive shaft of the fluid dispensing motor to the driven shaft with the first drive ratio, and

(b) a second drive train configured to selectively drivingly couple the shaft of the fluid dispensing motor to the driven shaft with the second drive ratio, and

(c) a drive train selector movable between a first position and a second position, such that when the drive train selector is in a first position, the first drive train drivingly couples with the drive shaft of the fluid dispensing motor, and when the drive train selector is in a second position, the second drive train drivingly couples with the drive shaft of the fluid dispensing motor.

6. The syringe pump of Claim 5, wherein the transmission further comprises a transmission actuator that selectively moves the drive train selector between the first and the second positions.

7. The syringe pump of Claim 6, wherein the first drive train includes at least one reduction pulley that substantially reduces a rotational rate provided by the drive shaft, so that the drive shaft rotates a substantial number of times for each rotation of the driven shaft.

8. The syringe pump of Claim 6, wherein the first drive train comprises:

(a) a first drive shaft pulley disposed on the drive shaft;

(b) an idler shaft;

(c) a first idler pulley disposed on the idler shaft, the first idler pulley being substantially larger than the first drive shaft pulley;

(d) a first belt drivingly coupling the first drive shaft pulley to the first idler shaft pulley;

(e) a second idler pulley disposed on the idler shaft;

(f) a first driven shaft pulley disposed on the driven shaft; and

(g) a second belt drivingly coupling the second idler pulley to the first driven shaft pulley.

9. The syringe pump of Claim 8, wherein the second drive train comprises:

(a) a second drive shaft pulley disposed on the drive shaft;

(b) a second driven shaft pulley disposed on the driven shaft; and

(c) a second drive train belt drivingly coupling the second drive shaft pulley to the second driven shaft pulley.

10. The syringe pump of Claim 1, wherein the driven mass comprises a bearing disposed to rotatingly support the plunger, and further comprising:

(a) a syringe support configured to rotate the syringe about a longitudinal axis of the syringe; and

(b) a syringe motor drivingly coupled with the syringe support, such that when the syringe support is rotated by the syringe motor, a fluid contained within the syringe is rotated.

11. The syringe pump of Claim 10, wherein the syringe motor includes a syringe motor output shaft, and the syringe motor is drivingly coupled with the syringe support by a syringe drive train, the syringe drive train comprising:

(a) a syringe motor output shaft pulley disposed on the syringe motor output shaft;

(b) a syringe support pulley coupled to the syringe support; and

(c) a syringe drive train belt drivingly coupling the syringe motor output shaft pulley to the syringe support pulley.

12. The syringe of Claim 11, further comprising a controller operably coupled to the syringe motor, wherein the controller is configured to selectively control the syringe motor to rotate the syringe support at a rate selected to enable solid body rotation of the syringe and its contents.

13. A fluid dispensing device configured to operate in a first mode for accurately dispensing small volumes of a fluid, and in a second mode drawing a fluid into the fluid dispensing device more rapidly than can be achieved when the fluid dispensing device is operated in the first mode, comprising:

(a) a frame;

(b) a fluid reservoir, the fluid reservoir including a port and a piston, such that a linear displacement of the piston in a first direction displaces fluid from the fluid reservoir out through the port, while a linear displacement of the piston in an opposite direction draws a fluid from a source into the fluid reservoir through the port;

(c) a driven mass coupled to the piston, such that a linear displacement of the driven mass correspondingly linearly displaces the piston, the driven mass being slidingly supported by the frame;

(d) a driven shaft including a plurality of threads configured to engage a plurality of threads in the driven mass, converting a rotational motion of the driven shaft into a linear displacement of the driven mass;

(e) a transmission operably coupled to the driven shaft, the transmission enabling the driven shaft to be selectively driven using at least one of a first drive ratio and a second drive ratio, the first drive ratio being substantially higher than the second drive ratio and being used for accurately dispensing small volumes of a fluid in the first mode, and the second drive ratio being used for rapidly drawing a fluid into the fluid reservoir in the second mode; and

(f) a fluid dispensing motor having a drive shaft that is drivingly coupled to the transmission, such that a rotation of the drive shaft results in a corresponding rotation of the driven shaft at a rate that is based on the drive ratio selected by the transmission.

14. The fluid dispensing device of Claim 13, further comprising a duplex bearing set supported by the frame, the duplex bearing set being disposed to rotatably support the driven shaft, the duplex bearing set being selected to reduce a pulsatility associated with the fluid dispensing device.

15. The fluid dispensing device of Claim 13, wherein the driven mass comprises a nut coupled to a relatively larger mass, wherein the nut includes the plurality of threads that engage the plurality of threads on the driven shaft.

16. The fluid dispensing device of Claim 13, wherein the driven mass is selected to enhance a rigidity associated with the fluid dispensing device.

17. The fluid dispensing device of Claim 13, wherein the first drive ratio substantially increases a number of rotations of the fluid dispensing motor drive shaft required to achieve a single rotation of the driven shaft.

18. The fluid dispensing device of Claim 13, wherein the port of the fluid reservoir fluid is coupled in fluid communication with an imaging flow cytometer, so that a fluid that is dispensed by the fluid dispensing device is introduced into the imaging flow cytometer.

19. The fluid dispensing device of Claim 13, wherein the port of the fluid reservoir fluid is coupled in fluid communication with a hydrodynamically focused flow cell, so that the fluid that is dispensed by the fluid dispensing device is introduced into the hydrodynamically focused flow cell.

20. The fluid dispensing device of Claim 19, wherein the fluid dispensing device comprises a portion of a fluid dispensing system that further includes core fluid dispensing device coupled in fluid communication with the hydrodynamically focused flow cell, so that a fluid dispensed from the core fluid dispensing device is also introduced into the hydrodynamically focused flow cell, a fluid dispensed from the fluid dispensing device being employed as a sheath fluid, and a fluid dispensed from the core fluid dispensing device being employed as a core fluid.

21. The fluid dispensing device of Claim 20, wherein the fluid dispensing system further includes a calibration fluid dispensing device also coupled in fluid communication with the hydrodynamically focused flow cell, so that a fluid dispensed from the calibration fluid dispensing device is also introduced into the hydrodynamically focused flow cell and is incorporated into the core fluid, a fluid dispensed by the core fluid dispensing device comprising a sample, and a fluid dispensed by the calibration fluid dispensing device comprising calibration beads.

22. The fluid dispensing device of Claim 13, wherein the transmission comprises:

(a) a transmission motor coupled to the frame;

(b) a plate slidingly mounted to the frame, the plate being movably coupled to the transmission motor, such that the transmission motor is employed to move the plate between a first position and a second position, the fluid dispensing motor being coupled to the plate and moving with the plate;

(c) a first drive train configured such that when the plate is disposed in the first position, the first drive train drivingly couples the shaft of the fluid dispensing motor to the driven shaft with the first drive ratio, and

(d) a second drive train configured such that when the plate is disposed in the second position, the second drive train drivingly couples the shaft of the fluid dispensing motor to the driven shaft with the second drive ratio.

23. The fluid dispensing device of Claim 22, wherein the transmission motor comprises an output shaft having a threaded portion, the output shaft being drivingly rotated by the transmission motor, and wherein the plate is movably coupled to the transmission by a bracket that is coupled to the plate, the bracket including a threaded portion configured to engage the threaded portion of the output shaft, such that rotation of the output shaft linearly displaces the plate.

24. The fluid dispensing device of Claim 22, wherein the first drive train includes at least one reduction pulley that substantially reduces a rotational rate of the driven shaft relative to the drive shaft, such that the drive shaft rotates a substantial number of times for each rotation of the driven shaft.

25. The fluid dispensing device of Claim 13, wherein the driven mass comprises a bearing disposed to rotatingly support the piston, and further comprising:

(a) a fluid reservoir cradle rotatably supported by the frame; and

(b) a fluid reservoir motor coupled to the frame, the fluid reservoir motor being drivingly coupled with the fluid reservoir cradle, such that when the fluid reservoir cradle is rotated by the fluid reservoir motor, a fluid contained within the fluid reservoir is moved.

26. The fluid dispensing device of Claim 25, further comprising a controller operably coupled to the fluid reservoir motor to selectively control the fluid reservoir motor to rotate the fluid reservoir cradle at a desired rate.

27. The fluid dispensing device of Claim 25, wherein the desired rate ensures that particles entrained in a fluid contained in the fluid reservoir move in a substantially circular pattern.

28. The fluid dispensing device of Claim 25, wherein the desired rate enables solid body rotation of the fluid reservoir and its contents.

29. The fluid dispensing device of Claim 25, wherein the desired rate is between about one revolution per minute and about ten revolutions per minute.

30. The fluid dispensing device of Claim 29, wherein the desired rate is about three revolutions per minute.

31. The fluid dispensing device of Claim 25, wherein the controller is operably coupled to the fluid dispensing motor to rotate the fluid reservoir cradle at the desired rate for at least a predefined period of time before the fluid dispensing motor is energized to dispense a fluid contained in the fluid reservoir.

32. The fluid dispensing device of Claim 25, wherein the controller does not enable the fluid reservoir cradle to be rotated while the fluid dispensing motor is energized to dispense a fluid contained in the fluid reservoir.

33. A method for dispensing a fluid containing substantially uniformly distributed particulates entrained therein, comprising the steps of:

(a) providing a container having an axis, the container including a volume of the fluid in which is entrained a plurality of particulates;

(b) rotating the container about its axis, such that the particulates become substantially uniformly distributed within the fluid in the container; and

(c) dispensing the fluid independently of the rotation of the container.

34. A method for dispensing a fluid containing substantially uniformly distributed particulates entrained therein, comprising the steps of:

(a) providing a container having an axis, the container including a volume of fluid in which is entrained a plurality of particulates;

(b) rotating the container about its axis using a rate of rotation that results in the fluid, the particulates in the fluid, and the container achieving solid body rotation; and

(c) dispensing the fluid independently of rotating the container.

35. A method for dispensing a fluid containing substantially uniformly distributed particulates entrained therein, comprising the steps of:

(a) providing a container having an axis, the container including a volume of fluid in which is entrained a plurality of particulates;

(b) rotating the container about its axis using a rate of rotation that results in the particulates in the fluid tracing a substantially circular pathway; and

(c) dispensing the fluid independently of rotating the container.

36. A method for dispensing a fluid containing substantially uniformly distributed particulates entrained therein, comprising the steps of:

(a) providing a container having an axis, the container including a volume of fluid in which is entrained a plurality of particles, the container including a member configured to dispense fluid from the container when the member is manipulated;

(b) rotating the container about its axis before dispensing the fluid in the container, such that the particulates become substantially uniformly distributed within the fluid in the container;

(c) halting the rotation of the container;

(d) dispensing the fluid when the container is not rotating; and

(e) repeating steps (b), (c), and (d).

37. The method of Claim 36, wherein the container is rotated at a rate that results in a solid body rotation of the container, the fluid and the particulates entrained within the fluid.

38. The method of Claim 36, wherein the container is rotated at a rate that results in particulates entrained within the fluid tracing a substantially circular path.

39. The method of Claim 36, wherein the container is rotated at a rate that is between about one revolution per minute and about ten revolutions per minute.

40. The method of Claim 36, wherein the container is rotated at a rate of about three revolutions per minute.

41. The method of Claim 36, further comprising the step of ceasing dispensing of the fluid from the container before repeating steps (b), (c), and (d).

42. The method of Claim 36, wherein the container is rotated using a motor, and further comprising the step of matching a frequency modulation and phase characteristics of the motor to a rate of rotation of the container, thereby reducing a pulsatility induced in the dispensing of the fluid.

43. The method of Claim 36, further comprising the steps of:

(a) rotating the container about its axis during the step of dispensing the fluid, for a period of time sufficient to enable the particulates to become substantially uniformly distributed within the fluid in the container; and

(b) halting the rotation of the container.